

REMARKS

The examiner has rejected claim 30 as lacking support in the specification as originally filed. Applicant has amended claim 30 to overcome this rejection.

Applicant has also amended claim 32 to include the features of claim 35 and has canceled the dependent claims 33 and 34. Amendment of claim 32 in this manner does not raise new issues, because all issues of patentability of claim 32, as amended, have previously been raised by claim 35. Cancellation of the dependent claims 33 and 34 avoids the possibility of the amendment of claim 32 affecting the scope of the dependent claims.

The examiner has rejected all the claims on the ground of obviousness both over Redhead et al in view of Middlin et al and over CA-910 in view of Middlin et al.

The subject matter of this application is an apparatus and method for removing a deposit accumulated in electrolytic refining on the surface of an electrode. As set forth in claim 23, the apparatus comprises a support structure (corresponding to the structure 10 in the case of the embodiment described with reference to the drawings) for supporting the electrode (corresponding to the cathode 1) substantially stationarily in a generally vertical orientation. The support structure includes at least one element (the element 8 or 9) for restraining a lower edge of the electrode against horizontal movement, and at least one element (6 or 7) for restraining an upper edge of the electrode against horizontal movement. At least one stripping element (13) is turnable about a horizontal axis (14) spaced from the electrode and has an end that is spaced from the horizontal axis and moves vertically relative to the electrode during turning of the stripping element and engages the deposit on the surface of the electrode intermediate the lower and upper edges of the electrode. A control element is coupled drivingly to the stripping element for turning the stripping element, whereby cooperation of the stripping element and the elements for restraining the lower and upper edges of the electrode against

horizontal movement causes bending of the electrode.

As set forth in claim 32, the method comprises supporting the electrode substantially stationarily in a generally vertical orientation, restraining upper and lower edges of the electrode against horizontal movement, providing at least one stripping element that is turnable about a horizontal axis spaced from the electrode, and turning the stripping element about the horizontal axis, whereby an end of the stripping element that is spaced from the horizontal axis engages the deposit on the surface of the electrode intermediate the lower and upper edges of the electrode and moves vertically relative to the electrode and causes bending of the electrode.

Thus, in accordance with both claim 23 and claim 32, the electrode is supported in a vertical orientation and is subject to bending by contact with the stripping element moving vertically relative to the electrode. Claim 32, as now amended, is further limited by virtue of the fact that the claim specifies that the deposit is a metal deposit on a surface of a cathode.

Redhead et al is concerned with removal of lead slimes from anodic surfaces in a process for the electrolytic refining of lead and removal of manganese dioxide coatings from anodic surfaces in a zinc electrowinning process. See column 1, lines 23-56 and column 7, lines 41-49. Redhead et al teaches that these relatively loosely adhering deposits or layers can be efficiently removed by use of a power driven rotating member to which is attached a plurality of radially projecting elastomeric fingers. See column 4, lines 35-39. Redhead et al acknowledges that the mechanism by which the fingers are so effective is not understood (column 4, lines 65-66). However, Redhead et al explains that in operation of the apparatus, the tip of a finger is brought into contact with the removable layer 20. As the finger impacts on to the layer 20, the finger bends and flexes and digs into the layer, causing a build-up of material in front of the finger. As the finger moves further, the build-up breaks away, leaving a cleaned surface. See column 7, lines 20-25.

CA-910 discloses that manganese dioxide scale may be removed from an anodic surface in a zinc electrowinning process by use of a skeleton drum mechanism including rollers that impinge on the scale. The prior art discussed in CA-910 at page 3, lines 23-37 includes use of flexible fingers as disclosed by Redhead et al. According to CA-910, the skeleton rollers impinge in yieldable fashion against the surface of anode scale and dislodge the scale at its interface with the surface of the anode. See page 19, lines 12-17.

Based on the foregoing, it appears that in both Redhead et al and CA-910, the coating is rather soft and loosely adhering to the anodic surface. Neither Redhead et al nor CA-910 is concerned with removing a metallic deposit from a cathode.

Middlin et al, on the other hand, is concerned with a method of stripping electrolytically deposited copper from a cathode. The copper deposits adhere firmly to the cathode and are evidently stiff and self-supporting, since otherwise the wedges 13 that are forced between the copper deposits and the cathode would not separate the deposits from the cathode but would simply cause the copper deposits to bend or crumple. Middlin et al teaches that the copper deposits may be separated from the cathode by bending the cathode.

The examiner asserts that it would have been obvious in view of Middlin et al to modify the apparatus disclosed by Redhead et al or CA-910 so as to arrive at the apparatus of claim 23. Specifically, the examiner asserts that bending the electrode of Redhead et al or CA-910 would enhance cleaning efficiency.

Although both Redhead et al and Middlin et al are concerned with removing material from electrodes employed in an electrolytic process, the specific applications of Redhead et al and Middlin et al are quite different. In the case of Redhead et al, the deposits are non-cohesive and adhere only loosely to the anodic surface of an electrode, and are removable by flexible fingers that scrape the deposit from the electrode. Middlin et al, on the other hand, is concerned with removing a cohesive

sheet of copper that adheres firmly to the cathode sheet. Applicant submits that because the deposit of Redhead et al is relatively loose and non-cohesive, bending of the electrode would not effect separation of the deposit from the electrode. Therefore, a person of ordinary skill in the art would see no advantage to employing a mechanism for bending the electrode in the apparatus of Redhead et al.

For similar reasons to those discussed above in connection with the rejection over Redhead et al in view of Middlin et al, applicant submits that bending of the anode shown by CA-910 would not effect separation of the manganese dioxide scale from the anode and therefore a person of ordinary skill in the art would see no advantage to employing a mechanism for bending the electrode in the apparatus disclosed by CA-910.

The examiner has suggested in the advisory action mailed August 11, 2009 that adding a mechanism for bending the electrode to the apparatus of Redhead et al or CA-910 would enable the cleaning apparatus to clean different kinds of electrodes successfully, hence enhancing the cleaning efficiency for cleaning different electrodes. The examiner therefore implicitly acknowledges that it would not have been obvious to employ bending to remove lead slimes or manganese dioxide scale from an anode, but suggests that by providing the possibility of bending the electrode the cleaning apparatus of Redhead et al or CA-910 would be made more versatile: the same apparatus could be used both to remove a loose and non-cohesive coating from an anode and to remove a firmly-adhering metallic deposit from a cathode.

The prior art does not show that there has been any recognition in the art of a need to provide a single cleaning apparatus to perform two distinct tasks, namely removing non-cohesive deposits from anodic surfaces and removing metallic deposits from cathodic surfaces,

The length of the discussion in Redhead et al of the efforts devoted to producing apparatus for efficiently performing just one task, namely removing the soft layers of manganese dioxide

scale or lead slimes from an anodic surface, is sufficient to show that the examiner's analysis is incorrect. The prior art does not suggest that the apparatus of Redhead et al or CA-910 should be used for a task other than cleaning lead slimes or manganese dioxide scale from anodes of electrolytic cells, and applicant submits that to the person of ordinary skill it would be more important that the cleaning apparatus should perform its primary task efficiently than that it might hold out the possibility of performing multiple tasks.

Moreover, the Examiner's argument regarding incorporating a bending mechanism in the apparatus of Redhead et al or CA-910 is not applicable to the method of claim 32.

In view of the foregoing, applicant submits that the subject matter of claims 23 and 32 is not disclosed or suggested by Redhead et al, Middlin et al and CA-910, whether taken singly or in combination. Therefore, claims 23 and 32 are patentable and it follows that the dependent claims also are patentable.

Claim 32 has been amended and now recites that the deposit is metal on a surface of a cathode. Since neither Redhead et al nor CA-910 is concerned with removing a metal deposit from a cathode, applicant submits that claim 32 is patentable independently of claim 23.

Respectfully submitted,

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